

Laboratory Testing

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In Review

Laboratory testing may be used to revise/refine the following descriptors on a LOTB:

- Soil
 - Group Name
 - Group Symbol
 - Percent or Proportion of Soils
 - Particle Size Range
 - Plasticity
 - Consistency
 - Rock Strength
- } ASTM 2487

Other Lab Tests

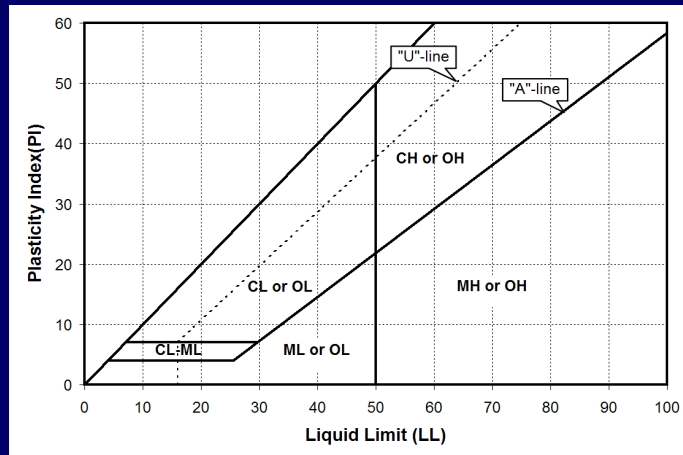
- Strength Tests
 - Triaxial
 - Direct Shear
 - Point Load Index Test
- Compressibility
 - Consolidation test

ASTM 2487: Unified Soil Classification System (USCS)

- Determines a Soil's Group Name and Group Symbol.
- Coarse-grained Soils
 - Well-graded Gravel (GW)
 - Poorly-graded Sand (SP)
- Fine-grained Soils
 - Lean Clay (CL)
 - Elastic Silt with Gravel (MH)

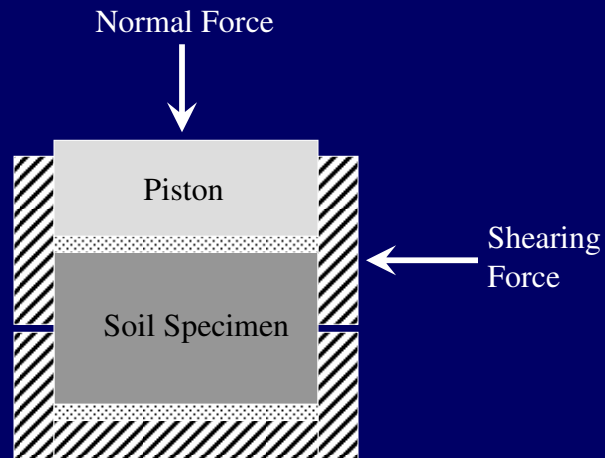
ASTM 2487: Unified Soil Classification System (USCS)

- Sieve Analysis to determine percentages of:
 - Coarse-grained particles
 - Gravel (1/5 in. to 3 in.)
 - Sand (1/300 in. to 1/5 in.)
 - Fine-grained particles
 - Silt and Clay (less than 1/300 in.)
- Plasticity Index test to determine the Classification of fine-grained materials, where
 - Plasticity Index = Liquid Limit – Plastic limit

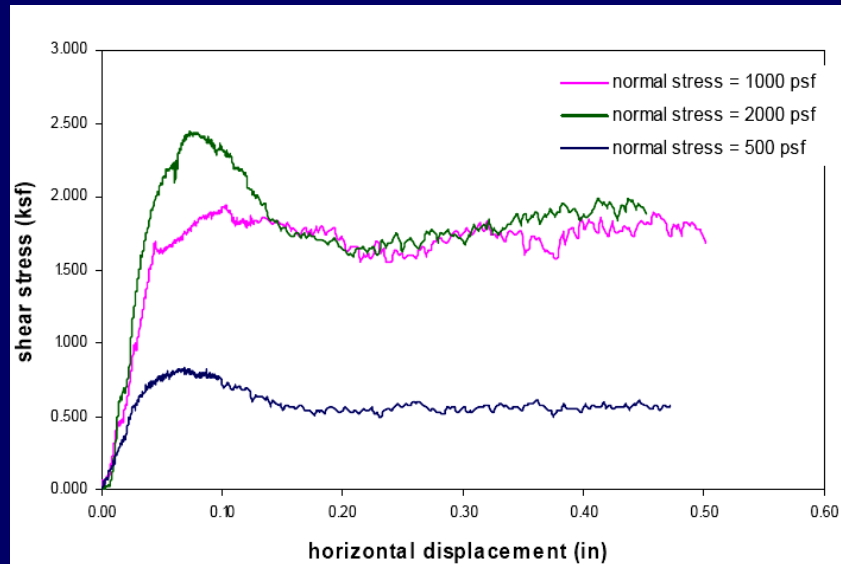


- Liquid Limit is the moisture content between the plastic and semiliquid states
- Plastic Limit is the moisture content between the plastic and semisolid states.

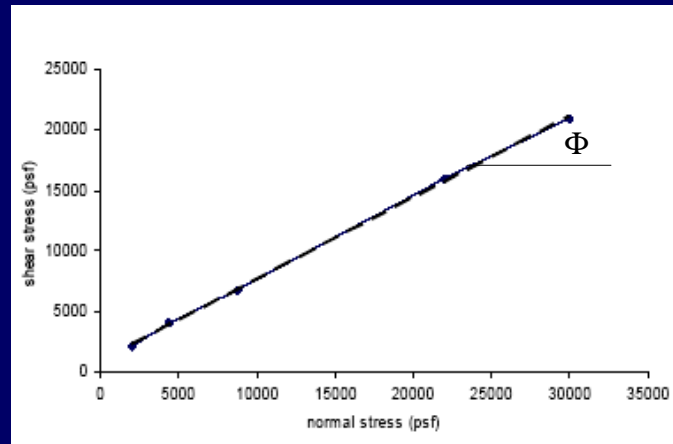
Direct Shear Test



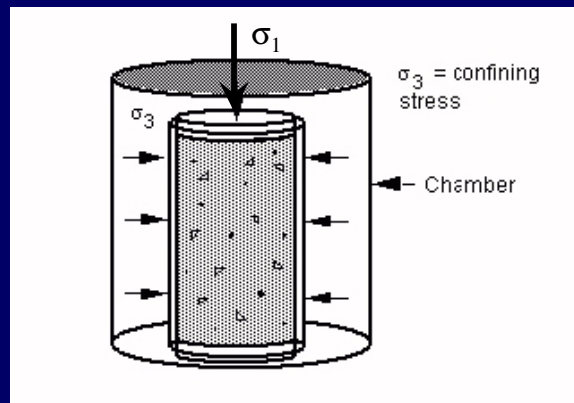
Direct Shear Results



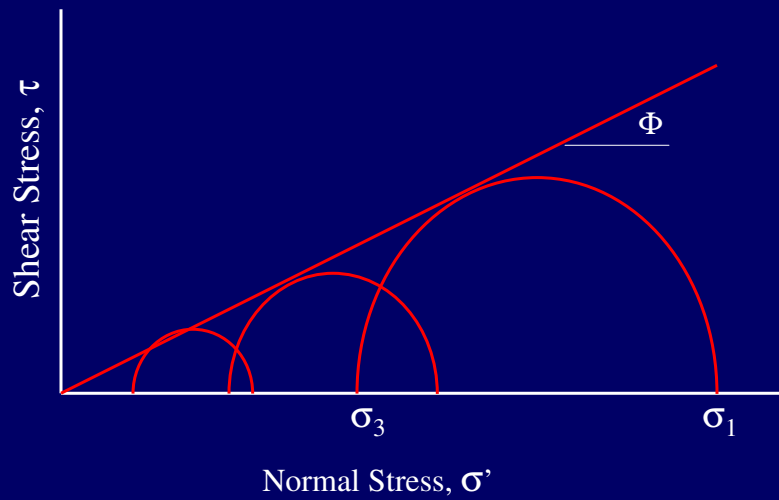
Direct Shear Failure Envelope



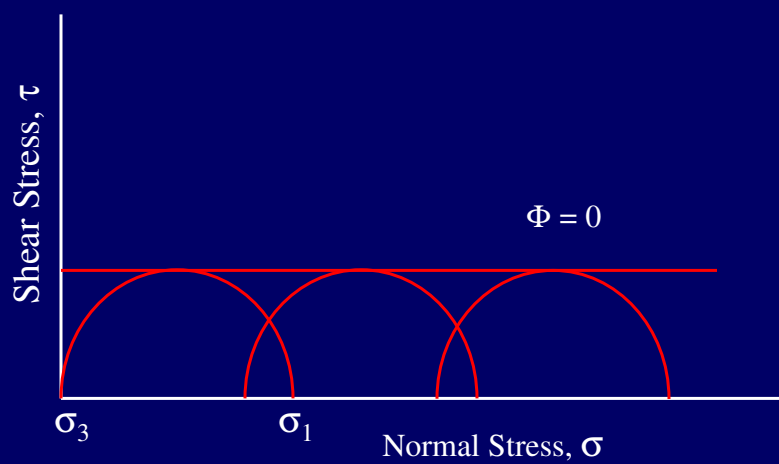
Triaxial Test



Triaxial Test Results Granular Soil (Drained)



Triaxial Test Results Cohesive Soil (Undrained)



Triaxial Test Results Cohesive Soil (Undrained)

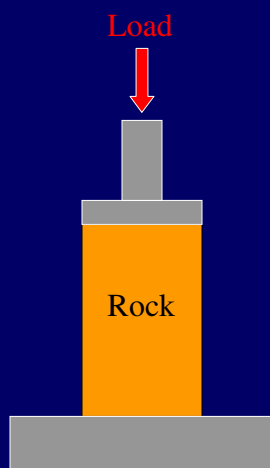
Before



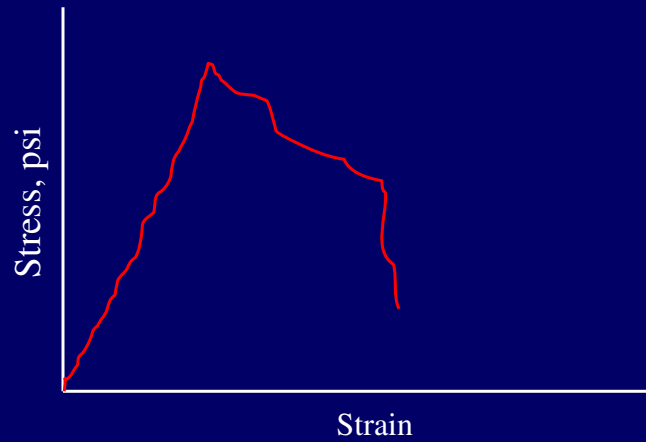
After



Unconfined Compression Test



Unconfined Compression Test



Unconfined Compression Test Results

Before



After



Unconfined Compression Test Results

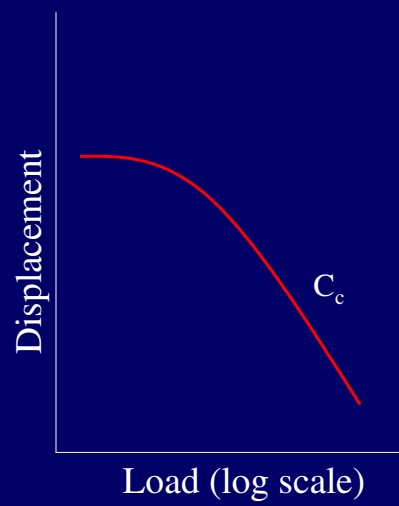
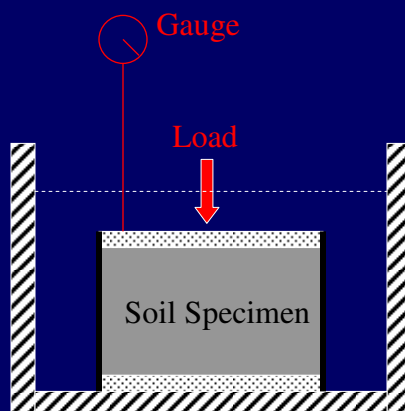
Before



After



Consolidation Test



Corrosion Testing

- Chloride >500 ppm
- Sulfate >2000 ppm
- pH < 5.5
- Causes modifications to concrete mix, steel thickness and protection

Dry Creek Bridge Project

- Particle Size Analysis (PA) on SAND for liquefaction
- Plasticity Index (PI) on CLAY
- Triaxial (UU) on CLAY for strength abutment slope stability
- Consolidation on CLAY for embankment settlement
- Unconfined Compression (UC) on ROCK for design and bidding
- Corrosion on CLAY and SAND

Questions